

# GROUND WATER BROCHURE OF SULTANPUR DISTRICT, U.P.

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## DISTRICT AT GLANCE

### 1. GENERAL INFORMATION

District	:	Sultanpur
i. Geographical Area (Sq. Km.)	:	4436
ii. <b>Administrative Division</b> (as on 31.3.2008)		
a) Number of Tehsil	:	7
b) Number of Block	:	23
c) Number of Panchayat (Nyay)	:	187
d) Number of Villages (developed)	:	2499
iii. Population (as on 2001 census)	:	32,14,830
iv. Average Annual Rainfall (mm)	:	1005.1

### 2. GEOMORPHOLOGY

Major Physiographic Units	:	Gomti alluvial plain underlain by quaternary alluvium comprising sand of various grade with clay & kankar
Major Drainages	:	Gomti, Majauli & Sai river with Kadhi & Chamraura nalas.

### 3. LAND USE (Sq. Km.)

a) Forest area	:	20.57
b) Net area sown	:	2836.51
c) Cultivable are	:	2933.76

### 4. MAJOR SOIL TYPES : Sandy Clay (Dumat)

### 5. AREA UNDER PRINCIPAL CROPS (2006-2007) : 408813 ha

#### Rabi + Kharif

### 6. IRRIGATION BY DIFFERENT SOURCES

(Areas and Number of Structures)

Dugwells	:	41 / 853
Govt. Tubewells / Borewells	:	9446 / 757
Private Tubewells & Pumpsets	:	160860 / 132832
Canals	:	62887 / 1876
Net Irrigated Area	:	233309 ha
Gross Irrigated Area	:	364295 ha

### 7. NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2008)

No. of Dugwells	:	39
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	No. of Piezometers	:	Nil
<b>8.</b>	<b>PREDOMINANT GEOLOGICAL FORMATIONS</b>	:	
<b>9.</b>	<b>HYDROGEOLOGY</b>	:	
	Major water bearing formation	:	Sand of various grades, clay and kankar.
	(Pre-monsoon Depth to water level during 2008)	:	2.97-14.58 mbgl
	(Post-monsoon Depth to water level during 2008)	:	0.98-12.12 mbgl
		:	
	Long term of water level trend (1998-2007) in m/yr	:	Rise 0.0052 to 0.3230 m/yr Fall 0.0332 to 0.4866 m/yr
<b>10.</b>	<b>GROUND WATER EXPLORATION BY CGWB : (As on 31-3-2008)</b>		
	No. of wells drilled (EW, OW, PZ, SH, Total)	:	EW-6, PZ-2
	Depth Range (m)	:	85.00-599.10
	Discharge (litres per minutes)	:	378-3150
	Storativity (S)	:	-
	Transmissivity (m <sup>2</sup> /day)	:	82-2788
<b>11.</b>	<b>GROUND WATER QUALITY</b>	:	Nil
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	:	Nil
	Type of water		
<b>12.</b>	<b>DYNAMIC GROUND WATER RESOURCES (2004)-in MCM</b>		
	Annual Replenishable Ground Water Recharge	:	171308.51 ham
	Gross Annual Ground Water Draft	:	114934.09 ham
	Net Annual Ground Water Availability	:	157948.53 ham
	Stage of Ground Water Development	:	72.77%
<b>13.</b>	<b>AWARENESS AND TRAINING ACTIVITY</b>	:	
	Mass Awareness Programmes organized	:	Nil
	Date		
	Place		
	No. of Participants		
	Water Management Training Programme (Artificial Recharge) organized		
	Date		

- Place
- No. of Participants
- 14. EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING** : Nil
- Projects completed by CGWB (No of Amount Spent)
- Projects under technical guidance of CGWB (Numbers)
- 15. GROUND WATER CONTROL AND REGULATION** :
- Number of OE blocks : Nil
- Number of critical blocks : Nil
- Number of semi-critical blocks : Nil
- 16. MAJOR GROUND WATER PROBLEMS AND ISSUES** :
- Water logged and prone to logged around canal command area in the district : Sultanpur proper and Lambua tehsil ground water exploitation may be stopped where DTW rests more than 10 mbgl. Artificial recharge scheme must be adopted in upper two blocks.

Note: Latest available data may be incorporated,

# **GROUND WATER BROCHURE OF SULTANPUR DISTRICT, U.P.**

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## **1.0 INTRODUCTION**

Sultanpur district lies between 25<sup>0</sup>58' to 26<sup>0</sup>40' north latitude and 81<sup>0</sup>33' to 82<sup>0</sup>40' east longitude. Total geographical area of the district is 4436 sq. km. District headquarter is at Sultanpur having 7 (seven) number tehsils and 23 (twenty three) number of blocks. As per 2001 census district has population 3214830 of which 1623820 males and 1591010 females. Rural population is 3062570 and urban population is 152260. Scheduled caste population is 715300 and scheduled tribe is 470 only. Geologically the area comprises quarternary alluvium. Alluvial formation consists of clay. Kankar and granular material comprising medium to coarse sand and gravel which by and large forms the principal aquifer. The river Gomti divides the district into two unequal tracts, the larger lying in south & smaller in the north. Each of these tracts has the same natural divisions running almost parallel to the rivers. Physiographically the area can be divided into the following three sub-units:

1. Gentle Plain south & north of Gomti river
2. Gentle undulating tract roughly parallel to the course of Gomti river.
3. Gomti Valley

The main source of irrigation in the district is canals and tubewells. The total net irrigated area is 233000 ha. And the net area sown (culturable) is 284000 ha, which shows that about 82% area is irrigated and the rest area depends on rainfall. Length of canal in the district is 1876 km. and number of government tubewell is 757. The number of private tubewell and pumpset is 132844.

Sultanpur district is mainly drained by Gomti which is perennial and its tributaries. Gomti river flows through the district from north-west to south-east. Kadhi Nala, a tributary of Gomti river and Chamraura Nala a tributary of Sai river drain the south-western part of the district. The north-eastern part of the district is drained by Majauli river, which is a tributary of Tons river form the north-eastern boundary of the district.

The district was covered under the hydrogeology and ground water potential of Sultanpur district by Shri Ram Pratap, Jr. Hydrogeologist in 1979. The hydrogeological investigation also done by Shri S. Mukherjee, Sc. 'D' in 1991, the report titled hydrogeological framework and ground water development potential of Sultanpur district. Recently in A.A.P. 2001-02 the undersigned carried out ground water management studies in Sultanpur district.

## **2.0 RAINFALL & CLIMATE**

The average annual rainfall is 1005.1 mm. The climate is sub-humid and it is characterised by a hot summer and a pleasant cold season, About 89% of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to ground water.

May is generally the hottest month with mean daily maximum at 41<sup>0</sup>C, the mean daily minimum at 26<sup>0</sup>C and maximum temperature reaches upto 48<sup>0</sup>C. With the advance of the monsoon by about middle of June there is appreciable drop in the day temperature but the nights continue to be warm. January is usually the coldest month with the mean daily maximum temperature at 22.4<sup>0</sup>C and mean daily minimum at 8.8<sup>0</sup>C. The mean monthly maximum temperature is 32.4<sup>0</sup>C and mean monthly minimum temperature is 19.<sup>0</sup>C.

The relative humidity is high during the southwest monsoon season, after withdrawal of the monsoon, humidities decreases and by summer which is driest part of the year. The mean monthly maximum relative humidity is 65% and mean monthly minimum relative humidity is 51%.

Winds are generally light to moderate with some strengthening during later part of summer and monsoon season. The mean wind velocity is 4.4 Kmph.

The potential evapotranspiration is 1519.7 mm

### **3.0 GEOMORPHOLOGY & SOIL**

#### **3.1 GEOMORPHOLOGY:**

River Gomti divides the district into two unequal tracts, the larger lying in south and smaller in the north. Each of these tracts has the same natural divisions running almost parallel to the rivers. These divisions are Gomti valley, central level land and low-lying tract having general slope towards south east.

#### **3.2 SOIL:**

In Sultanpur district chief variations of soil are Dumat or loam which is a mixture of sand and clay in various proportions, Matiyar or clay and Bhur or sand. Pre-dominant soil of the district is loam or Dumat occurring in central level land. Matiyar occurs in low lying areas while Bhur is found along the river Gomti. The low-lying land consists of paddy land with patches of "Usar" swamps and marshes.

### **4.0 GROUND WATER SCENARIO**

Sultanpur district is underlain by quaternary alluvial deposits. The formations are chiefly composed of sand, sandy clay, clay with varying amount of kankar. The older alluvium generally occupies a large part of the area away from the flood plain of Gomti river whereas newer alluvium occupies the low lying areas and is restricted to flood plains mainly in the narrow belt, along the course of rivers. However the lithological character of both of the units are more or less similar.

#### **4.1 HYDROGEOLOGY:**

On the basis of hydrogeological information a three tier aquifer system has noticed in the area.

##### **i) Uper I<sup>st</sup> Aquifer Group:**

It generally occurs between the depth range of 25.00 & 130.00 mbgl and constitutes the most potential aquifer group covering almost the entire area below the

soil capping. The aquifer material is fine to medium sand, kankar variably occurs with clay formations. Ground water occurs under unconfined to confined conditions. The quality of the formation water is fresh and potable.

**ii) The Middle / Second Aquifer Group:**

This aquifer group is separated with the overlying shallow aquifer group by a thick clay and occurs between the depth range of 80 & 240 mbgl. Geoelectrical logging down to 450 mbgl in boreholes reveals in general, that upper fresh aquifer over lies a saline / brackish aquifer which in turn is underlain by a fresh confined ground water system. The source of saline ground water might be the result of sea water intrusion into the aquifer in the geological past. Ground water in this aquifer generally occurs under confined condition, the confining layers being thick impermeable clay layers. The clay content in this zone varies between 70% & 88%. This zone is not being tapped by tubewell construction due to its enrichment in salt content in water.

**iii) The Lower / Deep Aquifer Group:**

This fresh aquifer system occurring below the saline counterpart, has been tapped in the deeper exploratory tubewell structures constructed by CGWB. Depth limit of this potential aquifer system from land surface is 180 m to 410 mbgl. The aquifer material is fine to medium sand.

**DEPTH TO WATER LEVEL:**

As per depth to water level data of 39 permanent ground water monitoring stations of the year 2008. Pre-monsoon water level varies from 2.97 (Gortabad) to 14.58 mbgl (Sikrabad Para). In post-monsoon period depth to water level varies from 0.98 to 12.12 mbgl. Water level fluctuation varies from 1.78 (Nagaupur Bhajan) to 4.25 m (Musafirkhana). Shallow water level observed at canal command / network area and the deeper water level was noticed at central part NW to SE of the area along Gomti river.

The shallow water level (0.00-3.00 mbgl) observed in the form of small pocket in western part of the district in Jamo block. The water level gradually increases towards Gomti river.



#### **LONG TERM WATER LEVEL TREND:**

Long term water level records in the area from 43 NHS from 1998 to 2007 (10 years). After calculation & compilation of water level, it is found that only 5 NHS are showing rising trend and rest of 38 NHS are showing decline trend. The rising of water level varies from 0.0052 (Goriabad) to 0.3230 m/year (Ahimani) and falling trend showing from 0.0332 (Jaisinghpur) to 0.4866 m/year (Amethi)

In Sultanpur district CGWB constructed two piezometers (1 deep & 1 shallow) and seven exploratory wells at depth range from 82.59 mbgl to 430.97 mbgl with a discharge of 378 to 3150 lpm constructed during 1959 to 1984. The transmissivity varies from 68.50 m<sup>2</sup>/day to 2308 m<sup>2</sup>/day.

#### **4.2 GROUND WATER RESOURCES:**

As per report on dynamic ground water resource of Sultanpur district as on 31.03.2004. The annual ground water recharge of the district is 171308.51 ham, the net annual ground water availability is 15794853 ham. The existing gross ground water draft for all uses is 114934.09 ham. The net ground water availability for future irrigation development is 38784.67 ham. The stage of ground water development is 72.77%. As per the estimates worked out all the blocks of the district are in 'safe' category.

#### **4.3 GROUND WATER QUALITY OF SULTANPUR:**

The electrical conductance is in range of 350 to 1800 µm/cm at 25<sup>0</sup>C, Total hardness is 160 to 290 mg/l, Flouride is 0.12 to 1.27 mg/l, Nitrate is upto 191 mg/l, which is high. Phosphate is not present.

The Arsenic content ranges from nd to 87 microgram/litre in the ground water of the district.

#### **4.4 STATUS OF GROUND WATER DEVELOPMENT:**

In all blocks of the district ground water development takes place through dugwells, borewells, government tubewells, private tubewell / pumpsets. The shallow dugwells are found in canal command area and the deeper ones are located along the river Gomti. The wells are generally meet out the domestic and irrigation requirements. About 1/3<sup>rd</sup> area irrigated through surface water (canal) and the

remaining 2/3<sup>rd</sup> area irrigated through ground water. There are 757 numbers of state tubewells, irrigates 9446 ha area. The maximum numbers of state tubewells found in Kadipur block (79 Nos.) & minimum in Gauriganj block (3 Nos.). The private tubewell are 132832 in the district irrigates 160860 ha area of the district. The minimum number of private tubewells are in Sangrampur block (2627 Nos.) & maximum number are in Akhand Nagar block (11122 Nos). The canal is 1876 km in the district irrigates 62887 ha area. It shows that 2/3<sup>rd</sup> area irrigated by ground water & 1/3<sup>rd</sup> area irrigated by surface water.

CGWB constructed 6 no. tubewells & 2 no. Pz under exploratory programme. The yield of tubewell is 378 to 3150 lpm with drawdown 6.1 to 25.66 m. The total number of 2499 handpumps constructed in the district showing one handpump in each village.

### **DYNAMIC GROUND WATER RESOURCES OF SULTANPUR**

**(As on 31.03.2004)**

Sl. No.	Assessment Units-Blocks	Annual Ground Water Recharge (in ham)	Net Annual Ground Water Availability (in ham)	Existing Gross Ground Water Draft For All Uses (in ham)	Net Ground Water Availability For Future Irrigation Development (in ham)	Stage of Ground Water Development (in %)	Category of Block
1.	Akhand Nagar	8972.76	8524.12	7073.53	1371.67	82.98	Safe
2.	Amethi	5445.71	5173.43	4147.15	877.14	80.16	Safe
3.	Baldirai	7625.90	7244.60	5602.31	1394.40	77.33	Safe
4.	Bhadar	6577.83	6248.94	4357.42	1707.11	69.73	Safe
5.	Bhadiyan	7642.92	7260.77	5644.98	1384.69	77.75	Safe
6.	Bhetua	6885.15	6196.63	4807.23	1184.34	77.58	Safe
8.	Dhanpatganj	10556.11	10028.30	6718.54	3118.51	67.00	Safe
9.	Dostpur	9337.00	8870.15	7540.80	1108.38	85.01	Safe
10.	Dubeypur	6549.06	5894.16	5189.78	436.56	88.05	Safe
11.	Jagdishpur	7047.28	6342.55	3938.05	2164.80	62.09	Safe
12.	Jaisinghpur	9070.34	8163.31	6020.80	1867.83	73.75	Safe
13.	Jamo	9938.77	8944.90	5205.76	3556.56	58.20	Safe
14.	Kadipur	10736.74	9663.07	6367.61	3073.18	65.90	Safe
15.	Kuribhar	9935.24	8941.72	6355.79	2364.25	71.08	Safe
16.	Kurwar	8702.18	7831.96	6428.19	1083.13	82.08	Safe

Sl. No.	Assessment Units-Blocks	Annual Ground Water Recharge (in ham)	Net Annual Ground Water Availability (in ham)	Existing Gross Ground Water Draft For All Uses (in ham)	Net Ground Water Availability For Future Irrigation Development (in ham)	Stage of Ground Water Development (in %)	Category of Block
17.	Lambhua	9358.20	8890.29	6534.38	2181.85	73.50	Safe
18.	Musafirkhana	6241.83	5617.65	4585.82	928.74	81.63	Safe
19.	Pratappur	6748.91	6411.46	3789.43	2454.61	59.10	Safe
20.	Sangrampur	3152.06	2994.46	2359.55	492.89	78.80	Safe
21.	Shahgarh	7066.41	6359.77	3069.82	3213.33	48.27	Safe
22.	Shukul Bazar	7205.13	6484.61	4064.34	2243.38	62.68	Safe
	<b>TOTAL</b>	<b>171308.51</b>	<b>157948.53</b>	<b>114934.09</b>	<b>38784.67</b>	<b>72.77</b>	

## 5.0 GROUND WATER MANAGEMENT STRATEGY

### 5.1 GROUND WATER DEVELOPMENT:

The stage of ground water development in the district is 72.77%. The maximum stage of ground water development is in the Dubeypur block (88.05%) and minimum stage of development is in Shahgarh block (48.27%). All the 23 blocks of Sultanpur district are in 'Safe' category.

### 5.2 WATER CONSERVATION STRUCTURE & ARTIFICIAL RECHARGE:

The southern part of the district especially Sultanpur proper and Lambua tehsil where water level is more than 10.00 mbgl. Artificial recharge to the ground water may be implemented through roof top rain water harvesting method.

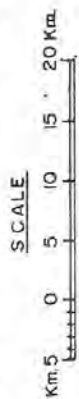
## 6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

In western part of the district especially in Jamo and Gauriganj block water logged prone to logged and salinity problem was noticed. In those blocks water level recorded around 2.00 to 3.00 mbgl.

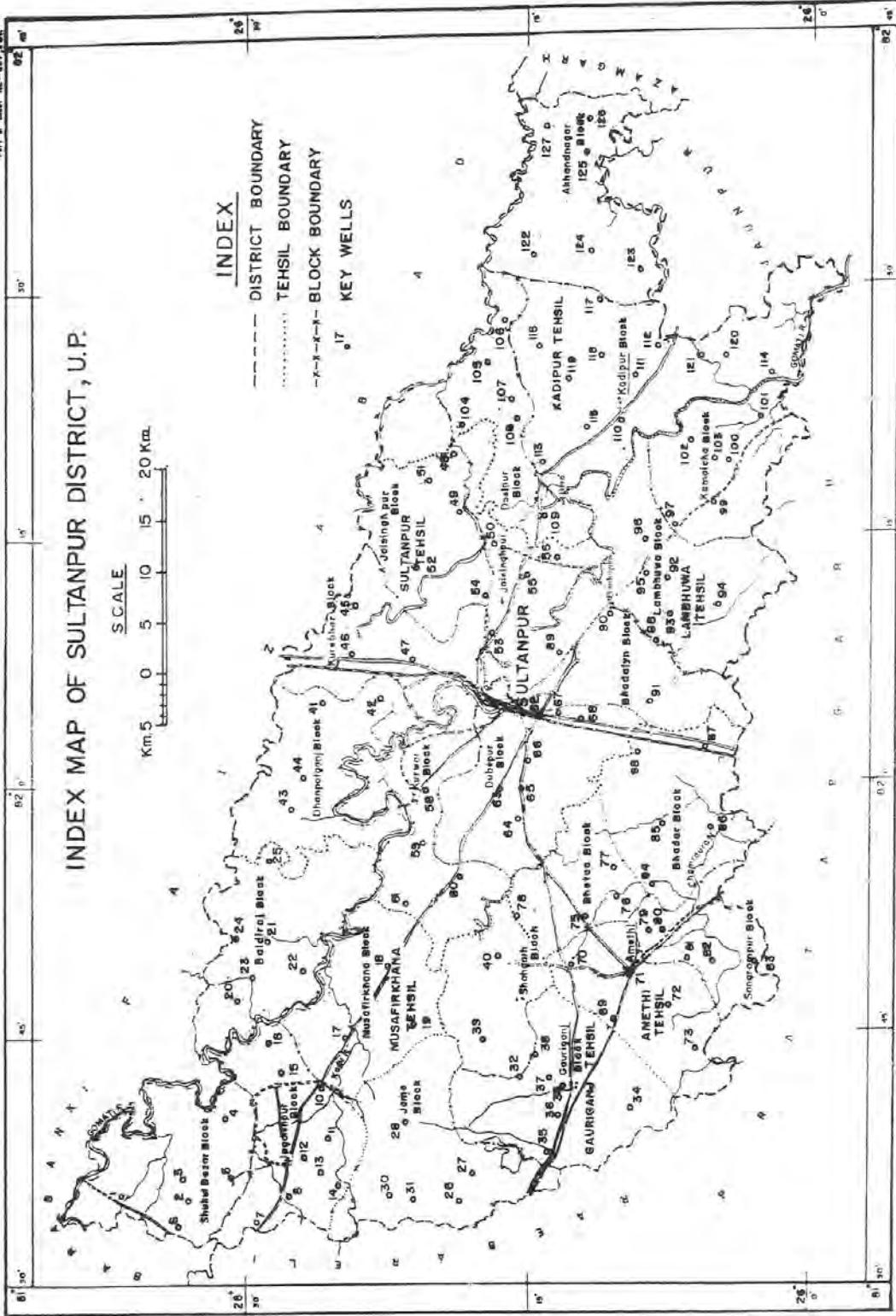
## **8.0 RECOMMENDATIONS**

- (1) In southern part of district mainly in Sultanpur proper and in Lambua tehsil the water level recorded more than 10.00 mbgl. In those 6 tehsils artificial recharge of ground water through roof top rain water harvesting must be adopted.
- (2) The network of canal must be discouraged at the western part of district (Jamo and Gauriganj block) where depth to water level is around 2.00 mbgl. At these places water logging & associated salinity is a common problem. The canal network must be encouraged at southeastern part of the district where water level is >10.00 mbgl. It will help in recharge of ground water.

# INDEX MAP OF SULTANPUR DISTRICT, U.P.

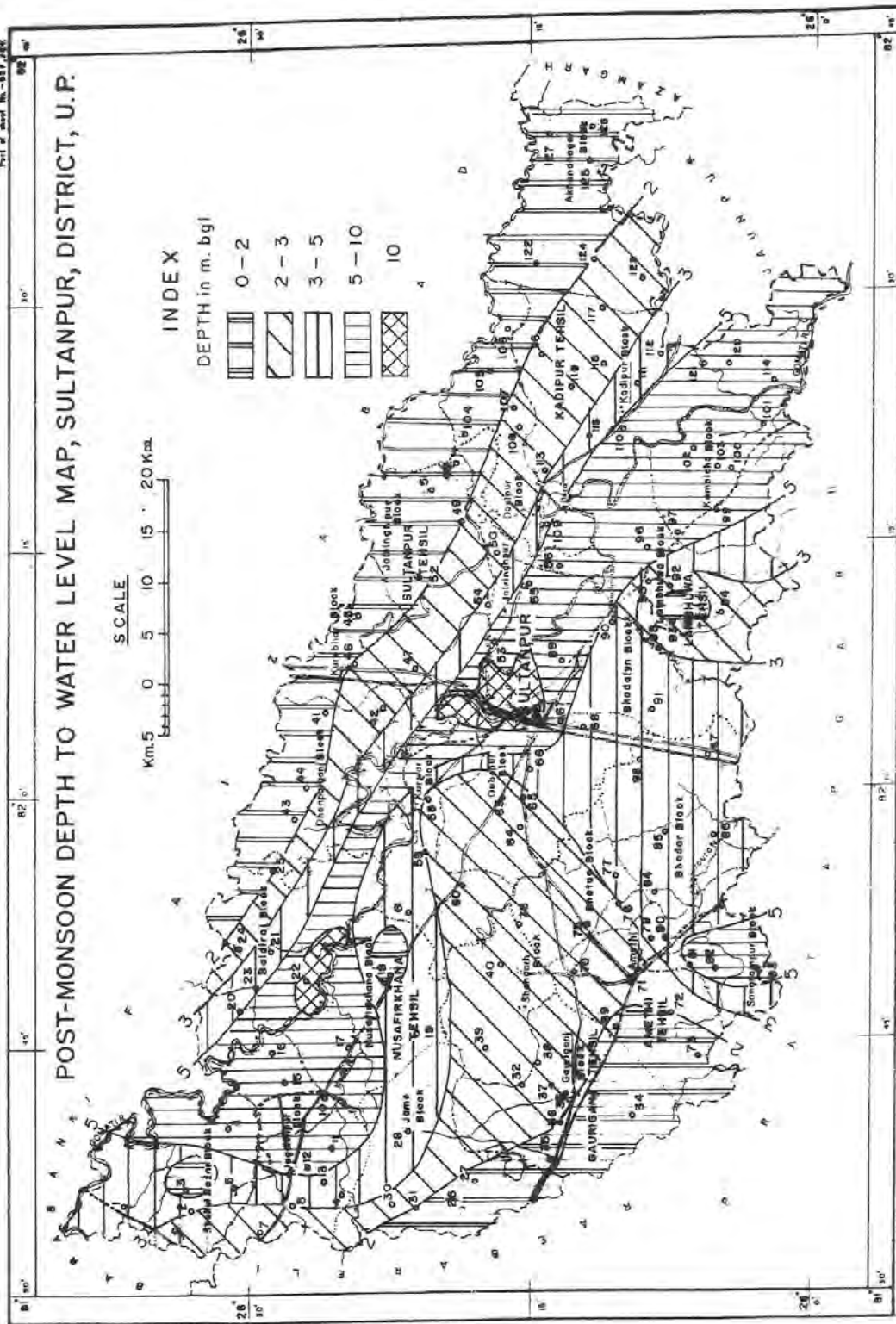


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- - - DISTRICT BOUNDARY
  - ..... TEHSIL BOUNDARY
  - x-x-x-x- BLOCK BOUNDARY
  - 17 KEY WELLS





POST-MONSOON DEPTH TO WATER LEVEL MAP, SULTANPUR, DISTRICT, U.P.



CGWB, NR (N. Chandra) Drg. 2824/10

GROUND WATER RESOURCE AND DRAFT OF SULTANPUR DISTRICT, U.P.

